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EXAMINER	
ROSENBERGER, FREDERICK F	

ART UNIT	PAPER NUMBER
2884	

DATE MAILED: 07/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/765,909	UMEGAKI ET AL.	
	Examiner	Art Unit	
	Frederick F. Rosenberger	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 May 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's reply, filed 2 May 2006, has been received and entered. Accordingly, changes have been made to the specification, abstract, and drawings. Claims 1, 4, 5, 7, 8, 10, 11, 13, and 17-19 have been amended. No claims have been cancelled or added. Thus, claims 1-22 are currently pending in this application.

2. The drawings were received on 2 May 2006. These drawings are acceptable.

3. Applicant's amendment of the abstract and specification has successfully overcome the objections to the abstract and specification, as detailed in paragraphs 7-8 of the previous Office action.

4. Applicant's amendment of the claims has successfully overcome the objections to claims 1, 2, 4, 5, 10, 11, 13, and 17, as detailed in paragraphs 9-10 of the previous Office action. New claim objections based on the amendment filed are detailed below.

5. Applicant's amendment of claims 7 and 19 has successfully overcome the rejection of claims 7, 9-12, and 19-22 under 35 U.S.C. 112, as detailed in paragraph 12 of the previous Office action.

Claim Objections

6. Claims 1, 7, 13, 18, and 19 are objected to because of the following informalities:

In claim 1, lines 7-8, "said direction" lacks proper antecedent basis within the claim. Applicant has amended the claim to recite "two orthogonal directions". As such, it is unclear which direction applicant is referring to. The recitation may be better as --a plane encompassing said orthogonal directions--.

In claim 1, line 8, "radiation passages, is" should probably be --radiation passages that is--.

In claim 7, line 5, "device in in two orthogonal" should probably be --device in two orthogonal--.

In claim 7, line 6, "the center each of the radiation passages" should probably be --a center of each of the radiation passages--.

In claim 13, lines 10-11, "on a line of another side surface prolong from the radiation detector" should probably be --on a line prolonged from another side surface of the radiation detector--.

In claim 13, lines 14, "cross-sectional area said" should probably be --cross-sectional area in said--.

In claim 13, lines 14-15, "said direction" lacks proper antecedent basis within the claim. Applicant has amended the claim to recite "two orthogonal directions". As such, it is unclear which direction applicant is referring to. The recitation may be better as --a plane encompassing said orthogonal directions--.

In claim 18, line 5, "in two orthogonal directions relative to the radiation detectors" should probably be --relative to the radiation detectors in two orthogonal directions-- for grammatical clarity.

In claim 18, lines 7-8, "said direction" lacks proper antecedent basis within the claim. Applicant has amended the claim to recite "two orthogonal directions". As such, it is unclear which direction applicant is referring to. The recitation may be better as --a plane encompassing said orthogonal directions--.

In claim 18, lines 8-9, "radiation passages, is" should probably be --radiation passages that is--.

In claim 19, line 9, "in two orthogonal directions relative to the radiation detectors" should probably be --relative to the radiation detectors in two orthogonal directions-- for grammatical clarity.

Appropriate correction is required.

7. Applicant is advised that should claim 1 be found allowable, claim 18 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claims 1 and 18 have been amended by applicant, thus removing the limitations that differentiated original claims 1 and 18. Namely, original claim 1 required either the

radiation detectors or the collimator be moved while original claim 18 required both the detectors and the collimator to be moved. The amendment of both claims removes the limitation of the motion of the radiation detectors, thus making claims 1 and 18 substantial duplicates of each other.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1, 3, 7, 9, 18, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Jeanguillaume (US Patent # 5,448,073).

With regards to claims 1 and 18, Jeanguillaume discloses a radiographic inspection apparatus in the form of a gamma camera system (Figure 8; column 10, lines 1-9) comprising:

A collimator **70** with a plurality of radiation passages **72** defined therein;

A plurality of radiation detectors, in the form of scintillator crystal **78** and an array of photomultiplier tubes **82**, for detecting radiation passing through passages **72,** wherein each of the radiation passages **72** has a cross-sectional area in the plane of rotation greater than the cross-sectional area of each of the radiation detectors (column 3, lines 57-60; column 10, lines 1-3; column 11, lines 8-11); and,

A moving device, in the form of motor driving pinion **73** and toothed crown **71**, for driving the collimator in rotation in a direction crossing the center axis **74** of the radiation detectors.

It is noted that the arcuate motion envisioned by Jeanguillaume in the embodiment of Figure 8 would necessarily include motion components in two orthogonal directions (i.e. an x-component and a y-component, which together generate the arcuate motion).

With regards to claim 3, Jeanguillaume discloses a drive control unit **46** for controlling a displacement drive device **40** (Figure 1).

With regards to claim 7, Jeanguillaume discloses a radiographic inspection apparatus in the form of a gamma camera system (Figure 8; column 10, lines 1-9) comprising:

A collimator **70** with a plurality of radiation passages **72** defined therein;

A plurality of radiation detectors, in the form of scintillator crystal **78** and an array of photomultiplier tubes **82**, for detecting radiation passing through passages **72,** wherein each of the radiation detectors each face their respective radiation passages, as illustrated in Figure 8; and,

A moving device, in the form of motor driving pinion **73** and toothed crown **71**, for driving the collimator in rotation in a direction crossing the center axis **74** of the radiation detectors.

It is noted that the arcuate motion envisioned by Jeanguillaume in the embodiment of Figure 8 would necessarily include motion components in two

orthogonal directions (i.e. an x-component and a y-component, which together generate the arcuate motion).

With regards to claim 9, Jeanguillaume discloses a drive control unit **46** for controlling a displacement drive device **40** (Figure 1).

With regards to claim 19, Jeanguillaume discloses a radiographic inspection method in the form of imaging with a gamma camera system described above with regards to claim 1 (Figure 8; column 10, lines 1-9) comprising:

Detecting the radiation passing through radiation passages **72** using the plurality of radiation detectors, in the form of scintillator crystal **78** and an array of photomultiplier tubes **82**; and,

Moving the collimator **70** in rotation in a direction crossing the center axis **74** of the radiation detectors.

It is noted that the arcuate motion envisioned by Jeanguillaume in the embodiment of Figure 8 would necessarily include motion components in two orthogonal directions (i.e. an x-component and a y-component, which together generate the arcuate motion).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 5, 6, 11, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeanguillaume, as applied to claims 1 and 7 above.

With regards to claims 5 and 11, Jeanguillaume discloses that the collimator **70** is movably attached to a shield **76**, serving as collimator holding members, wherein the collimator is allowed to rotate therebetween (column 10, lines 8-16). Jeanguillaume only discloses that the shield is a unitary member, not a pair of members. It would have been obvious to one having ordinary skill in the art at the time the invention was made to make the shield as a pair of members, since it has been held that constructing a formerly integral structure in various elements involves only routine skill in the art. In re Dulberg, 289 F.2d 522, 523, 129 USPQ 348, 349 (CCPA 1961).

With regards to claims 6 and 12, Jeanguillaume discloses that the array of radiation detectors is arranged within the shield **76**.

13. Claims 1-3, 5-9, 11-13, 15-19, 21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boxen (US Patent # 6,353,227) in view of Hoheisel et al. (US patent # 6,778,632).

Boxen discloses an apparatus and method for a dynamic collimator for use with a gamma camera, comprising a collimator **10** (Figure 1a) with a plurality of radiation passages **15**, a plurality of radiation detectors facing the radiation passages **15**, represented generally by gamma camera **11a**, wherein the gamma camera could comprise a plurality of scintillating optical fibers **19** (Figure 1b), for detecting radiation passing through the passages **15**, and a moving device **18** for moving the collimator relative to the detector (column 5, lines 41-45) perpendicular to the axis of the radiation passages **15** and parallel to the detection face of the gamma camera **11a**. Boxen further provides for the translation of the collimator to be in both the x- and y-directions in the plane of the collimator (column 3, lines 42-43; column 8, lines 42-49; column 11, lines 48-52).

Although Boxen discusses the scenario when the radiation passages **15** are larger than the detection areas of the scintillating optical fibers (column 6, lines 24-37), Boxen does not specifically disclose that the cross-section of the passages are greater than the cross-section of the detector elements in the plane parallel to the direction of motion.

Hoheisel et al. teach that a gamma detector and collimator arrangement wherein the cross-section of the collimator in the plane parallel to the face of the detector is

larger than the cross-section of the detectors in the same plane (Figure 5). Hoheisel et al. teach that this arrangement results in increased transparency for the primary radiation and thus a greater signal strength (column 4, lines 25-29). Further, such a collimator can be more easily manufactured while minimizing interference patterns (column 7, lines 14-20).

Thus, it would have been obvious for a person having ordinary skill in the art at the time the invention was made to use a collimator with radiation passages with a cross-section greater than the cross-section of the individual detectors in a plane parallel to the direction of motion of the collimator to allow for increased transparency of primary radiation while also providing a more easily manufactured collimator, as taught by Hoheisel et al.

With regards to claims 2, 8, 21, and 22, Boxen discloses the use of the collimator in SPECT imaging (column 10, line 64 – column 11, line 1).

With regards to claims 3 and 9, although not specifically disclosed by Boxen, a control device would be necessary to control the motor means **18** so as to provide controlled uniform motion over a given period of time to allow adequate photon sampling (column 5, lines 41-45).

With regards to claim 13, Boxen additionally discloses motion of the collimator such that the radiation passage progresses from position **1** to position **2** to position **3** and to position **4** before returning to position **1** (Figure 4; column 8, lines 31-49). As already discussed, Boxen teaches that the diameter **d** of the radiation passages may be equivalent or larger than the detector width (column 6, lines 24-37). Thus, in motion

steps of distance **d** (column 7, lines 44-51), the collimator would be moved from one side surface of the radiation detector to another side surface of the radiation detector.

With regards to claims 5, 6, 11, 12, 15, and 16, Boxen is silent with regards to how the collimator is held. However, some type of holding member is required in order to locate the collimator in front of the detector and allow it to move according to motion supplied by the motor means. Given the geometry of the collimator shown in Figure 1, it would have been obvious to use a pair of holding members since using a single holding member would result in a cantilevered and flimsy structure. Further, the use of more than two holding members would add only marginal rigidity while complicating unidirectional motion. Thus, it would have been obvious for a person having ordinary skill in the art at the time the invention was made to use a pair of holding members to provide sufficient rigidity for displacing the collimator relative to the detector. Since the collimator needs to be larger than the detector to prevent any stray radiation from reaching the detector and since the collimator is to be held by the holding members, it would obviously follow that the radiation detectors would be located between the holding members.

With regards to claim 17, although Boxen do not discuss signal-processing devices being provided for each detector, Boxen do disclose the use of scintillating fibers in the detection of gamma rays. It is common knowledge in the art that scintillator detectors emit light, which is detected by a photodetector, whose analog output is indicative of the intensity of the incident gamma radiation. In order to process the analog output into an image, signal processing is required to transform the analog

output into a digital signal for computer manipulation into a tomogram. Thus, it would have been obvious for a person having ordinary skill in the art at the time the invention was made to use signal processing devices for each detector since it was known in the art that such devices are necessary for image processing of the detected signal.

14. Claims 4, 10, 14, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boxen and Hoheisel et al., as applied to claims 1, 7, 13, and 19 above, and further in view of Zeng (US Patent # 6,762,413).

The combination of Boxen and Hoheisel et al. discloses all the limitations of parent claims 1, 7, 13, and 19, as discussed above. However, Boxen and Hoheisel are both silent with regards to a rotating device for rotating the inspection system around a bed on which a person to be examined is laid.

Zeng teaches a tomographic apparatus employing a gantry setup to rotate the detector **23** around a bed **10** supporting a patient (Figure 1). Zeng goes on to teach that the rotation of the detectors around the patient allows the monitoring of radiation for a plurality of directions (column 5, line 44-55). This plurality of views can then be used to generate a 3-D image of the detected radiation from a radiopharmaceutical in the patient instead of the standard 2-D view afforded by a planar motion detector.

Thus, it would have been obvious for a person having ordinary skill in the art at the time the invention was made to use a gantry system to rotate the detector around the patient so as to obtain a 3-D view of the radiation instead of a 2-D view, as taught by Zeng.

15. Claims 2, 4, 8, 10, and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeanguillaume, as applied to claims 1, 7, and 19, as described above, and further in view of Zeng (US Patent # 6,762,413).

With regards to claims 2, 4, 8, 10, and 20-22, Jeanguillaume discloses all the limitations of parent claims 1, 7, and 19, as discussed above. However, Jeanguillaume doesn't specifically disclose that the gamma camera system includes a tomogram forming device and a rotating device for rotating the detectors around a bed. Despite Jeanguillaume's silence on this matter, the use of gamma cameras in tomographic systems, especially orbiting systems, is well known in the art.

For example, Zeng teaches a gamma camera based tomographic apparatus employing a gantry setup to rotate the detector **23** around a bed **10** supporting a patient (Figure 1). Zeng goes on to teach that the rotation of the detectors around the patient allows the monitoring of radiation for a plurality of directions (column 5, line 44-55). This plurality of views can then be used to generate a 3-D image of the detected radiation from a radiopharmaceutical in the patient instead of the standard 2-D view afforded by a planar motion detector.

Thus, it would have been obvious for a person having ordinary skill in the art at the time the invention was made to use provide a gantry system to rotate the detector around the patient so as to obtain a 3-D view of the radiation instead of a 2-D view, as taught by Zeng. It would have further been obvious to one of ordinary skill in the art at the time the invention was made to include a tomogram forming device, since such a

device is necessary in order to form an image using the gamma camera system of Jeanguillaume or Zeng.

Response to Arguments

16. Applicant's amendment of claims 1, 7, and 19 has successfully overcome the rejection of claims 1-12 and 19-22 under 35 U.S.C. 103 as being unpatentable over Zeng, as detailed in paragraph 15 of the previous Office action. Zeng does not discuss motion of the collimator relative to the radiation detectors.

17. Applicant's arguments filed 2 May 2006 have been fully considered but they are not persuasive.

Applicant first argues that the references fail to show that the radiation passages of the collimator each have a cross-sectional area greater than that of the radiation detectors (see page 18 of the response filed 2 May 2006, last paragraph). It is maintained that each of the references shows radiation passages greater in cross-sectional area than the radiation detectors, as discussed in the original rejection. Figure 8 of Zeng clearly shows radiation passages defined by septa **102** larger than each radiation detector **23**. Further, Hoheisel et al. clearly illustrate (see Figure 5, for example) radiation passages defined by collimator **6** larger than the radiation detectors **7a**. It is also noted that Boxen discusses the scenario when radiation passages **15** are larger than the detection areas of scintillating optical fibers (column 6, lines 24-37).

18. Applicant also argues that the references fail to show the radiation passages of the collimator being moved relative to the radiation detectors in two orthogonal directions (in the response filed 2 May 2006, see page 18, last sentence through 1st full paragraph of page 19). It is agreed that Zeng fails to show the amended limitation of relative motion between the collimator and the detector. As such, applicant's amendment has overcome said rejection, as detailed above.

However, the second rejection relying on Boxen in view of Hoheisel is believed to be equally applicable to the amended claims. Boxen explicitly allows for the translation of the collimator in both the x- and y-directions in the plane of the collimator (column 3, lines 42-43; column 8, lines 42-49; column 11, lines 48-52). Although Boxen prefers only one-dimensional motion to reduce system complexity, it is evident from the disclosure of Boxen that some embodiments would allow for two-dimensional motion. Hoheisel is relied upon in the rejection for providing a teaching to modify prior art gamma camera systems with collimators to improve detection sensitivity and collimator fabrication, as detailed in the rejection laid out above.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Davis (US Patent # 6,690,767) discloses a collimator for use with a radiation detector wherein the cross-section of the radiation passages can be slightly greater than the radiation detector cross-sectional area. Davis also teaches that Bucky grids are commonly subjected to motion to prevent an image artifact.

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frederick F. Rosenberger whose telephone number is 571-272-6107. The examiner can normally be reached on Monday-Friday 8:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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